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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of

SHIOMOTO — Atty. Ref.: 925-193

Serial No. 09/846,317 — Group: 2828

Filed: May 2, 2001 — Examiner: Nguyen, T.

For: SEMICONDUCTOR LASER DEVICE

* *

September 11, 2003

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Applicant hereby appeals the Final Rejection of February 12, 2003, Paper No. 7.

REAL PARTY IN INTEREST

The real party in interest is Sharp Kabushiki Kaisha, a corporation of the country of Japan.

RELATED APPEALS AND INTERFERENCES

The appellant, the undersigned, and the assignee are not aware of any related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 1-12 are pending. Claims 1-11 have been rejected; but the Examiner has not indicated whether or not claim 12 is rejected. No claims have been expressly substantively allowed; although it is possible the Examiner considers claim 12 to be allowable since it has not been rejected.

STATUS OF AMENDMENTS

No amendments have been filed since the date of the Final Rejection. However, a "Response After Final" filed June 5, 2003 was considered by the Examiner and has been entered as evidenced by the Advisory Action dated June 23, 2003.

SUMMARY OF EXAMPLE EMBODIMENTS OF INVENTION

For purposes of example, and without limitation, certain example embodiments of this invention relate to a semiconductor laser device including first and second laser elements that have different emission wavelengths, and their arrangement based on temperature dependency on a support such as a submount.

Fig. 4 of the instant application, for example, illustrates a submount 20 that supports both a first laser element 30 (e.g., emission wavelength from 640-660 nm) and a second laser element 40 (e.g., emission wavelength from 770-800 nm). Laser element 40 has a *lower/smaller temperature dependency* than laser element 30. In other words, the power of laser element 40 is less affected by a given change in temperature (e.g., a temperature change of from 25 to 50 degrees C, or a change from 60 to 70 degrees C)

than is laser element 30 - compare Fig. 5 (large temperature dependency) to Fig. 6 (smaller temperature dependency).

An important feature of certain example embodiments of this invention is to locate the laser element having the lessor/smaller temperature dependency further from the mounting surface than the laser element with the larger temperature dependency. In other words, the laser element with the larger temperature dependency is located closer to the mounting surface. As explained on pages 3-4 of the instant specification, this is particularly advantageous in that it allows heat generated by the first laser element to be closer to the mounting surface and thus more easily dissipated through electrode 25; whereas the heat generated by the second laser element is dissipated via smaller electrode 35 and wire 36. Thus, it is advantageous to locate the laser element less susceptible to heat problems in an upper position farther from the mounting surface of the stem/submount or the like.

ISSUES

1. Whether claims 1, 3 and 5-11 are anticipated by Kato (US 4,901,325) under 35 U.S.C. Section 102(b).

2. Whether claim 2 is unpatentable over Kato in view of Fisli under 35 U.S.C. Section 103(a).

3. Whether claim 4 is unpatentable over Kato in view of Otsuka under 35 U.S.C. Section 103(a).

4. The status of claim 12. Has claim 12 been allowed? If not, then a new action should be issued since the Examiner did not address claim 12 in the Final Rejection or the Advisory Action.

GROUPING OF CLAIMS

The pending claims are grouped into the following separate and distinct groups which are patentably distinct from one another:

Group A: Claims 1 and 3

Group B: Claim 2

Group C: Claim 4

Group D: Claim 5

Group E: Claim 6

Group F: Claim 7

Group G: Claim 8

Group H: Claim 9

Group I: Claim 10

Group J: Claim 11

Group K: Claim 12

The reasons why these claim grouping are patentably distinct from one another are set forth below; each group is argued separately in view of the different limitations thereof.

ARGUMENT

It is axiomatic that in order for a reference to anticipate a claim, it must disclose, teach or suggest each and every feature recited in the claim. See, e.g., Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983). The USPTO has the burden in this respect.

Moreover, the USPTO has the burden under 35 U.S.C. Section 103 of establishing a *prima facie* case of obviousness. In re Piasecki, 745, F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). It can satisfy this burden only by showing that some objective teaching in the prior art, or that knowledge generally available to one of ordinary skill in the art, would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Before the USPTO may combine the disclosures of the references in order to establish a *prima facie* case of obviousness, there must be some suggestion for doing so. In re Jones, 958 F.2d 347 (Fed. Cir. 1992). Even assuming, *arguendo*, that a given combination of references is proper, the combination of references must in any event disclose the features of the claimed invention in order to render it obvious.

I. Group A: Claim 1 (together with claim 3)

Claim 1 stands rejected under 35 U.S.C. Section 102(b) as being allegedly anticipated by Kato (US 4,901,325). This Section 102(b) rejection should be reversed for at least the following reasons.

Claim 1 requires "a second semiconductor laser element disposed on *top* of said first semiconductor laser element, said second semiconductor laser element having an

emission wavelength different from the emission wavelength of said first semiconductor laser element and a temperature dependence *lower* than the temperature dependence of said first semiconductor laser element." In other words, claim 1 requires that the *laser element having the lessor temperature dependency is located further from the mounting surface than the laser element with the larger temperature dependency* (and thus the laser element with the larger temperature dependency is closer to the mounting surface). For example, see Fig. 4 of the instant application which illustrates that the laser element 40 having the lessor/smaller temperature dependency is located further from the mounting surface than the laser element 30 with the larger temperature dependency. The cited art fails to disclose or suggest the aforesaid aspect of claim 1.

Kato in Fig. 5 discloses first laser chip 44 and second laser chip 43 supported on a mounting surface of mount 52. The particular wavelengths of the laser chips for this embodiment are *not* mentioned in the reference. However, Kato clearly fails to disclose or suggest locating a laser element with a lessor temperature dependency farther from the mount than a laser element with a high temperature dependency as required by claim 1. There is nothing in Kato which states or suggests that chip 43 has a lessor temperature dependency than chip 44. Claim 1 cannot possibly be anticipated or otherwise rendered unpatentable by Kato.

Furthermore, in the Final Office Action, the Examiner's apparent contention that laser chips 43 and 44 in Fig. 5 of Kato operate at 780 nm and 830 nm, respectively, is wrong. There is nothing in Kato which supports the Examiner's allegation that laser chips 43 and 44 in Kato operate at 780 and 830 nm, respectively. The discussion in Kato at col. 11, lines 13-17, relates to laser chips 38 and 39 – not laser chips 43 and 44.

Additionally, in the Final Office Action the Examiner appears to contend that a laser chip operating at an emission wavelength of 780 nm *inherently* has a lessor temperature dependency than a laser chip operating at an emission wavelength of 830 nm. Again, this apparent contention by the Examiner is incorrect. Typically, a 780 nm-band semiconductor laser has a larger (not smaller/lessor) temperature dependency than a 830 nm-band semiconductor laser of the same material with only molar fractions of elements being different. Thus, even the Examiner's contention about temperature dependencies of respective laser elements is wrong.

Finally, the Examiner's new contention in the Advisory Action that laser chips with larger size inherently have larger temperature dependency is incorrect. This is not true. It is not surprising that the Examiner cites nothing in support of this bald contention, since the contention itself is untrue.

For the numerous reasons set forth above, it can be seen that the basis of the Final Rejection lacks merit and is fundamentally flawed. The rejection of claim 1 should be reversed.

II. Group B: Claim 2

Claim 2 stands rejected under Section 103(a) as being allegedly unpatentable over Kato in view of Fisli. This Section 103(a) rejection is incorrect and should be reversed for at least the following reasons.

Claim 2 requires " the emission wavelength of said first semiconductor laser element is within a wavelength range of 640-660 nm, while the emission wavelength of said second semiconductor laser element is within a wavelength range of 770-800 nm."

As explained above, Kato does not mention the wavelength ranges of chips 43 and 44 in Fig. 5. Moreover, the Examiner's apparent contention that laser chips 43 and 44 in Fig. 5 of Kato operate at 780 nm and 830 nm, respectively, is wrong. There is nothing in Kato which supports the Examiner's allegation that laser chips 43 and 44 in Kato operate at 780 and 830 nm, respectively. The discussion in Kato at col. 11, lines 13-17, relates to laser chips 38 and 39 – not laser chips 43 and 44.

The Office Action's alleged combination of Kato and Fisli is also fatally flawed. Citation to Fisli cannot cure the fundamental flaws of Kato described above. While Fisli discloses laser beams of 645, 755, 695, and 825 nm, none of these fall within the claimed range of 770-800 nm required by claim 11. Moreover, there is no suggestion in Fisli of placing a laser element in the range of 770-800 nm over top of a laser element having an emission wavelength in the range of 640-660 nm as required by claim 2. Thus, claim 2 is not met by the cited art either taken alone or in any reasonable combination.

Still further, Fisli relates to a raster scanner used in a xerographic printer. In contrast, Kato relates to a semiconductor laser in an optical head. One of ordinary skill in the art would never have combined the raster scanner of Fisli with the optical head of Kato; the alleged combination is non-sensical and clearly lacks any suggestion in the cited art.

III. Group C: Claim 4

Claim 4 stands rejected under Section 103(a) as being allegedly unpatentable over Kato in view of Otsuka. This Section 103(a) rejection is incorrect and should be reversed for at least the following reasons.

Claim 4 requires that "each of said first and second semiconductor laser elements has an N-layer and a P-layer, and either the N-layers or the P-layers of said first and second semiconductor laser elements are adjacent to each other."

The Office Action admits that Kato fails to disclose or suggest this aspect of claim 4. Admitting this flaw in Kato, the Office Action cites Otsuka. However, Otsuka has a P-electrode 26 adjacent to an N-electrode 37. Thus, Otsuka fails to disclose or suggest like conductivity type layers of the different laser elements adjacent one another as required by claim 4. Thus, even if the alleged combination were made (which applicant believes would be incorrect in any event), the invention of claim 4 still would not be met.

IV. Group D: Claim 5

Claim 5 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 5 requires that "each of said first and second semiconductor laser elements has an emission point and the emission points of said first and second semiconductor laser elements are located at an *interval of 160 micrometers or less*." Kato fails to disclose or suggest this aspect of claim 5.

V. Group E: Claim 6

Claim 6 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 6 requires that "there are a plurality of joined portions in which different *soldering materials having different melting points* are used." Again, Kato fails to disclose or suggest this aspect of claim 6.

VI. Group F: Claim 7

Claim 7 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 7 requires that "said plurality of *semiconductor laser elements are stacked in order of temperature dependence such that the laser chip farther from the mounting surface of the stem has a lower temperature dependence than the laser chip closer to the mounting surface of the stem.*" Again, Kato fails to disclose or suggest this aspect of claim 7.

Kato in Fig. 5 discloses first laser chip 44 and second laser chip 43 supported on a mounting surface of mount 52. The particular wavelengths of the laser chips for this embodiment are *not* mentioned in the reference. However, Kato clearly fails to disclose or suggest locating a laser element with a lessor temperature dependency farther from the mount than a laser element with a high temperature dependency as required by claim 7. There is nothing in Kato which states or suggests that chip 43 has a lessor temperature dependency than chip 44. Claim 7 cannot possibly be anticipated or otherwise rendered unpatentable by Kato.

VII. Group G: Claim 8/1

Claim 8 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 8 requires that "the second laser element emits a higher wavelength than does the first laser element that is closer to the mounting surface of the stem." Kato fails to disclose or suggest this aspect of claim 8. Moreover, even if the Examiner contention that chip 43 operates at 780 nm and chip 44 at 830 nm in Kato was true (the Examiner's contention is not true in this regard as explained above), this is the opposite of what claim 8 requires. Again, Kato is entirely unrelated to the invention of claim 8.

VIII. Group H: Claim 9/7

Claim 9 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 9 requires that "the second laser element emits a higher wavelength than does the first laser element that is closer to the mounting surface of the stem." Kato fails to disclose or suggest this aspect of claim 9. Moreover, even if the Examiner contention that chip 43 operates at 780 nm and chip 44 at 830 nm in Kato was true (the Examiner's contention is not true in this regard as explained above), this is the opposite of what claim 8 requires. Again, Kato is entirely unrelated to the invention of claim 9.

IX. Group I: Claim 10

Claim 10 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 10 requires "a second semiconductor laser element disposed at least partially over said first semiconductor laser element . . . . second semiconductor laser element having an emission wavelength higher than the emission wavelength of said first semiconductor laser element and *a temperature dependence lower* than the temperature dependence of said first semiconductor laser element so that *power of the second semiconductor laser element is less affected by a given change in temperature than power of the first semiconductor laser element which is closer to the mount.*" Again, Kato fails to disclose or suggest this aspect of claim 10.

X. Group J: Claim 11

Claim 11 stands rejected under Section 102(b) as being allegedly anticipated by Kato. This Section 102(b) rejection is incorrect and should be reversed for at least the following reasons.

Claim 11 requires "a first semiconductor laser element directly or indirectly mounted on the mounting surface of said stem, said first semiconductor laser element having an emission wavelength in a range of <u>640-660 nm</u>; and a second semiconductor laser element disposed <u>on top of</u> said first semiconductor laser element and having an emission wavelength in a range of <u>770-800 nm</u>." In other words, claim 11 requires that a laser element having an emission wavelength in the range of from 770-800 nm be located over top of a laser element having an emission wavelength of 640-660 nm. Kato fails to disclose or suggest this aspect of claim 11.

Still referring to claim 11, the Office Action apparently alleges that in Kato laser element 43 has an emission wavelength of 780 nm and laser element 44 has an emission wavelength of 830 nm. First of all, even if this were the case, the invention of claim 11

would not be met since these emission wavelengths do not fall within the claimed ranges. Second, the Office Action's interpretation of Kato is wrong in this respect as explained above. In particular, it is laser elements 38 and 39 (see Fig. 4) that have emission wavelengths of 780 and 830 nm (not elements 43, 44). Laser elements 38, 39 are not laid on top of one another over a mounting surface in Fig. 4 of Kato. Nothing in Kato suggests locating semiconductor laser elements with the wavelengths required by claim 11 on top of one another in the order recited in this claim.

XI. Group K: Claim 12

The status of claim 12 is unclear. The claim is not mentioned in the final rejection. However, the following is pointed out with respect to claim 12.

Claim 12 requires that "said second semiconductor laser element has a temperature dependence lower than a temperature dependence of said first semiconductor laser element so that power of the second semiconductor laser element is less affected by a given change in temperature than power of the first semiconductor laser element which is closer to the stem."

Kato fails to disclose or suggest the subject matter of claim 12 in this regard.

CONCLUSION

In conclusion it is believed that the application is in clear condition for allowance; therefore, early reversal of the Final Rejection and passage of the subject application to issue are earnestly solicited.

Respectfully submitted,

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APPENDIX

CLAIMS ON APPEAL

1. A semiconductor laser device comprising:

a stem having a mounting surface;

a first semiconductor laser element directly or indirectly mounted onto the mounting surface of said stem, said first semiconductor laser element having an emission wavelength and a temperature dependence; and

a second semiconductor laser element disposed on top of said first semiconductor laser element, said second semiconductor laser element having an emission wavelength different from the emission wavelength of said first semiconductor laser element and a temperature dependence lower than the temperature dependence of said first semiconductor laser element.

2. The semiconductor laser device according to claim 1, wherein the emission wavelength of said first semiconductor laser element is within a wavelength range of 640-660 nm, while the emission wavelength of said second semiconductor laser element is within a wavelength range of 770-800 nm.

3. The semiconductor laser device according to claim 1, wherein said second semiconductor laser element provided on top of the first semiconductor laser element is smaller in size than said first semiconductor laser element such that a part of a top surface of said first semiconductor laser element is exposed.

4. The semiconductor laser device according to claim 1, wherein each of said first and second semiconductor laser elements has an N-layer and a P-layer, and either the N-layers or the P-layers of said first and second semiconductor laser elements are adjacent to each other.

5. The semiconductor laser device according to claim 1, wherein each of said first and second semiconductor laser elements has an emission point and the emission points of said first and second semiconductor laser elements are located at an interval of 160 micrometers or less.

6. The semiconductor laser device according to claim 1, wherein there are a plurality of joined portions in which different soldering materials having different melting points are used.

7. A semiconductor laser device comprising:

a stem having a mounting surface; and

a plurality of semiconductor laser elements disposed one on top of another and directly or indirectly mounted onto the mounting surface of the stem, said plurality of semiconductor laser elements having different emission wavelengths and different temperature dependencies;

wherein said plurality of semiconductor laser elements are stacked in order of temperature dependence such that the laser chip farther from the mounting surface of the

stem has a lower temperature dependence than the laser chip closer to the mounting surface of the stem.

8. The laser device of claim 1, wherein the second laser element emits a higher wavelength than does the first laser element that is closer to the mounting surface of the stem.

9. The laser device of claim 7, wherein the laser chip farther from the mounting surface emits a higher wavelength than does the laser chip closer to the mounting surface of the stem.

10. A semiconductor laser device comprising:

a first semiconductor laser element supported by a mount, said first semiconductor laser element having an emission wavelength and a temperature dependence; and

a second semiconductor laser element disposed at least partially over said first semiconductor laser element and also supported by the mount, said second semiconductor laser element having an emission wavelength higher than the emission wavelength of said first semiconductor laser element and a temperature dependence lower than the temperature dependence of said first semiconductor laser element so that power of the second semiconductor laser element is less affected by a given change in temperature than power of the first semiconductor laser element which is closer to the mount.

11. A semiconductor laser device comprising:

a stem including a mounting surface;

a first semiconductor laser element directly or indirectly mounted on the mounting surface of said stem, said first semiconductor laser element having an emission wavelength in a range of 640-660 nm; and

a second semiconductor laser element disposed on top of said first semiconductor laser element and having an emission wavelength in a range of 770-800 nm.

12. The semiconductor laser device of claim 11, wherein said second semiconductor laser element has a temperature dependence lower than a temperature dependence of said first semiconductor laser element so that power of the second semiconductor laser element is less affected by a given change in temperature than power of the first semiconductor laser element which is closer to the stem.